

Aerosol / Cloud / SO₂ Session Summary

**AURA Validation Meeting
September 11-15, 2006
Boulder, CO**

Tuesday, September 12, 1:30 p.m. – 4:15 p.m.

Room 2503

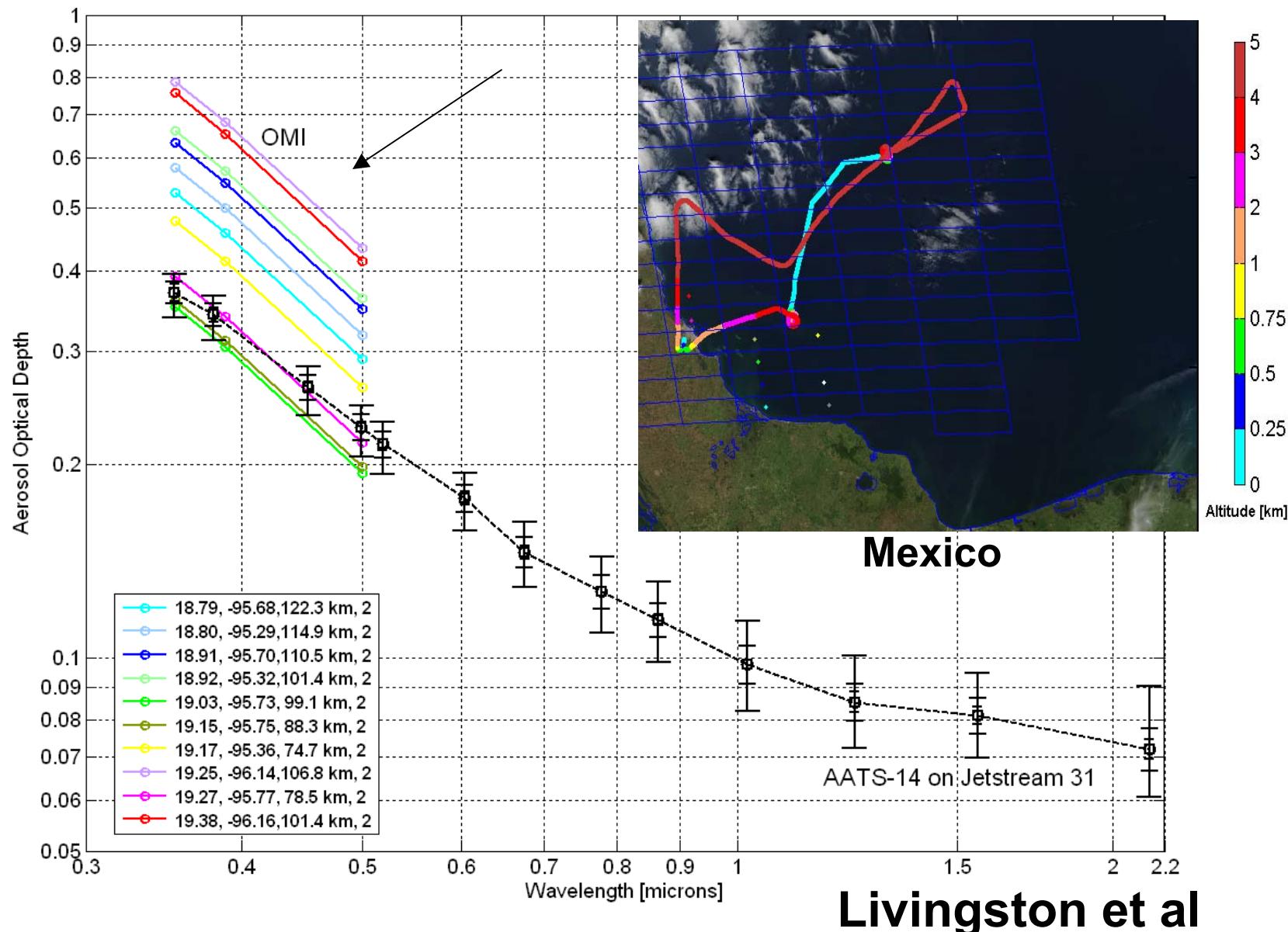
Aerosol/Cloud/SO₂ Working Group & Validation Subgroup Session
Session chair: Steve Massie (massie@ucar.edu)

1:30 - 1:42	Validation of HIRDLS observations of clouds and aerosols	S. Massie
1:42 - 1:54	MLS version 2 cloud ice and validation plan	D. Wu
1:54 - 2:06	Cross-comparison of Aura MLS and Aqua AIRS cloud measurements	J. Jiang
2:06 - 2:18	Comparisons of TES retrieved cloud products	A. Eldering
2:18 – 2:30	Intercomparisons of OMI and MODIS deep blue aerosol products	C. Hsu
2:30 - 2:42	Information on atmospheric aerosol in OMI measurements	B. Veihelmann
2:42 - 2:54	Aerosol optical depths from airborne sun photometry in INTEX-B/MILAGRO as a validation tool for OMI on Aura	J. Livingston
2:54 - 3:06	Validation of MODIS aerosol observations over the Netherlands with GLOBE student measurements	K. F. Boersma
3:06 - 3:18	NATIVE (Nittany Atmospheric Trailer and Integrated Validation Experiment) remotely sensed aerosol optical properties: examples from INTEX-B and WAVES 2006	B. Taubman
3:18 - 3:30	The 2006 boreal forest fire season as seen by OMI	O. Torres
3:30 – 3:42	OMI aerosol products and validation	R. Braak
3:42 - 4:15	Discussion Current issues / problem areas? Further validation needs? Papers planned for Aura validation special issue? Other topics?	

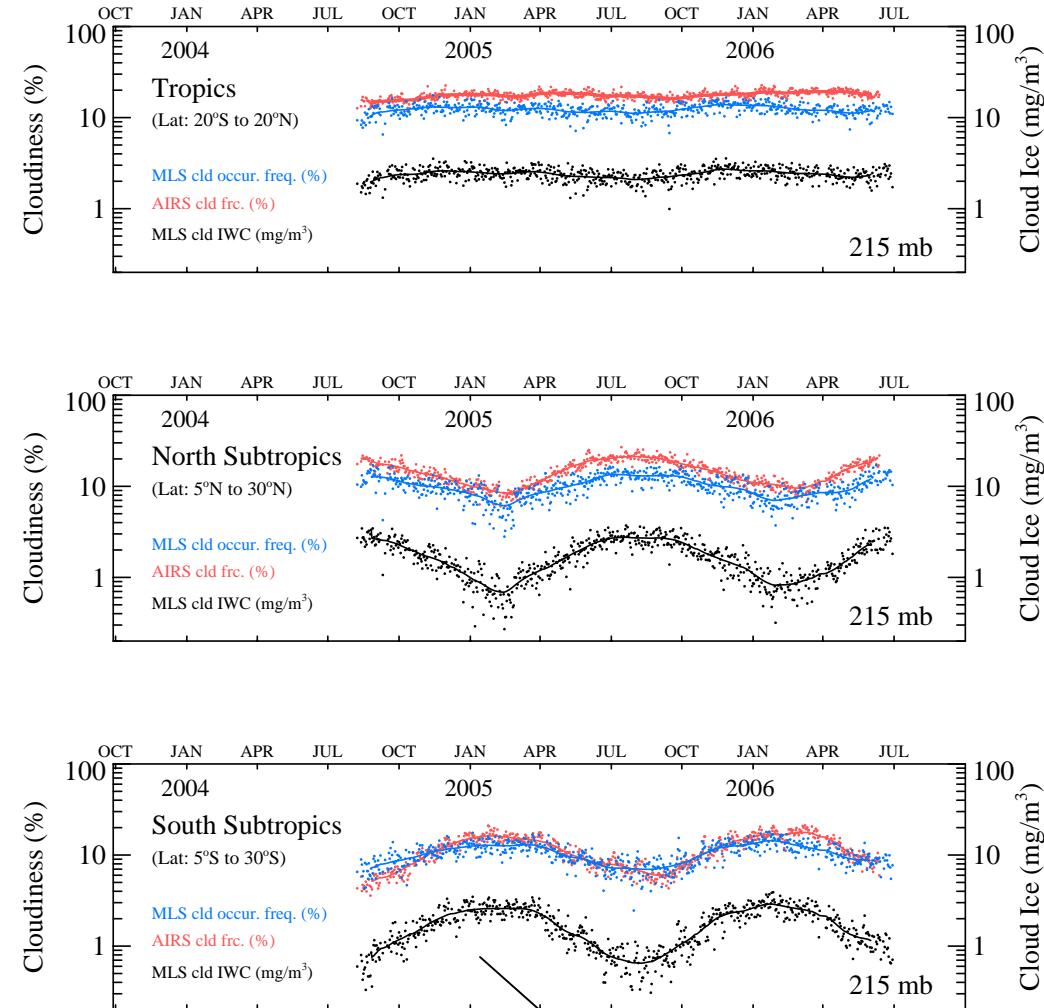
Validation Comparisons

Comparison of AOD spectra from AATS & OMI

10 Mar 2006



MLS and AIRS Comparison of Seasonal Cloudiness



The MLS IWC (mg/m³) and AIRS ⟨CFR⟩ (%) are two different quantities and thus they can not compare directly. But time series show they have the same seasonal variation, which they should.

The MLS cloud occurrence frequency (%) is computed as total number of cloud detected divided by total number of samples. They show good agreement with AIRS ⟨CFR⟩.

Time-series of collocate and coincident cloud observations between MLS and AIRS. Each dot represents daily averages for regions of Tropics (top-panel), north subtropics (mid-panel) or south subtropics (lower-panel). The solid lines are the monthly running means of the daily values. For all three regions, the different colors illustrate the following: black is the mean MLS IWC (mg/m³), red is the mean AIRS ⟨CFR⟩ (%), blue is the cloud occurrence frequency observed by the MLS.

Red – AIRS
Blue - MLS

IWC

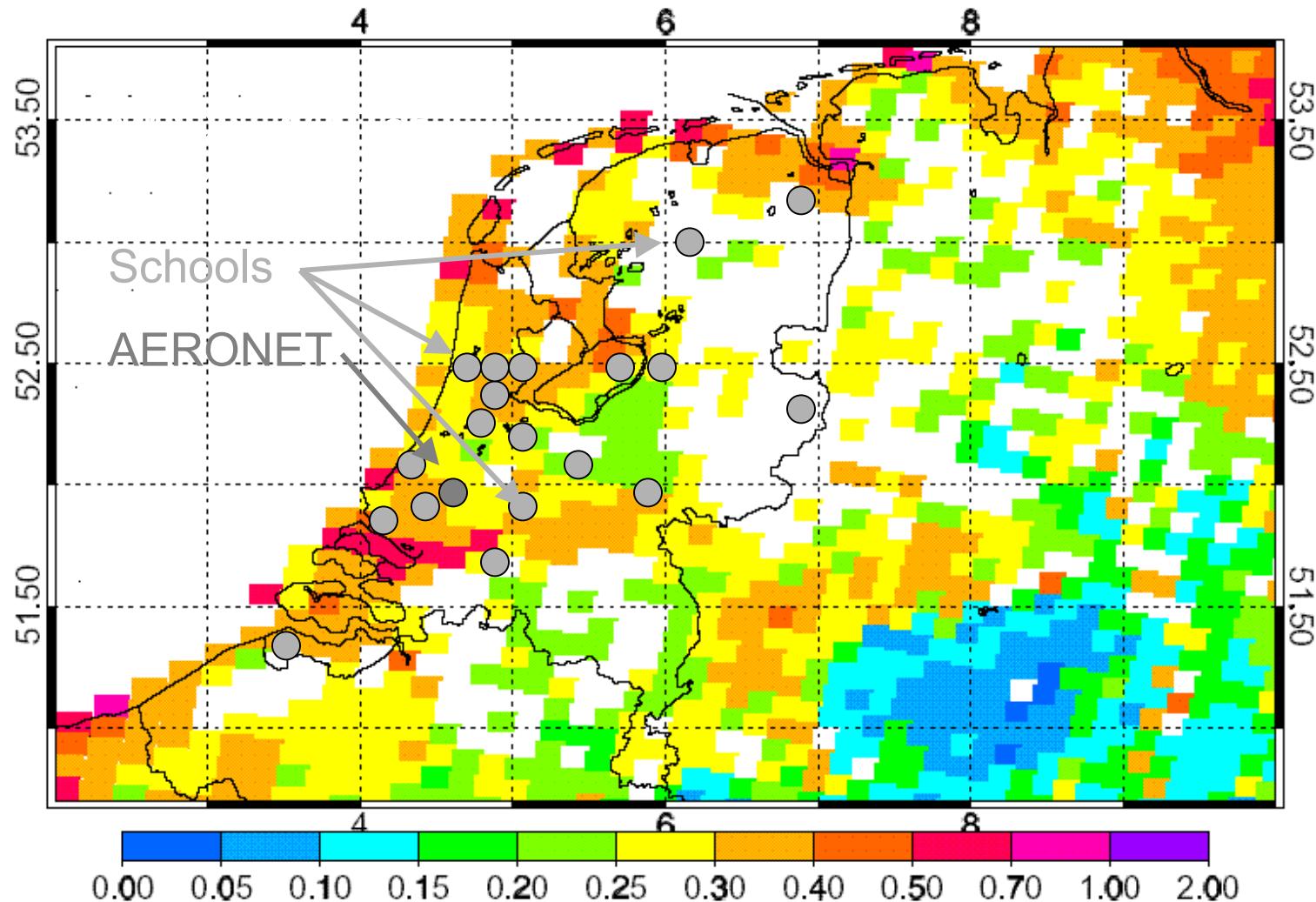
Jiang et al



The GLOBE Program

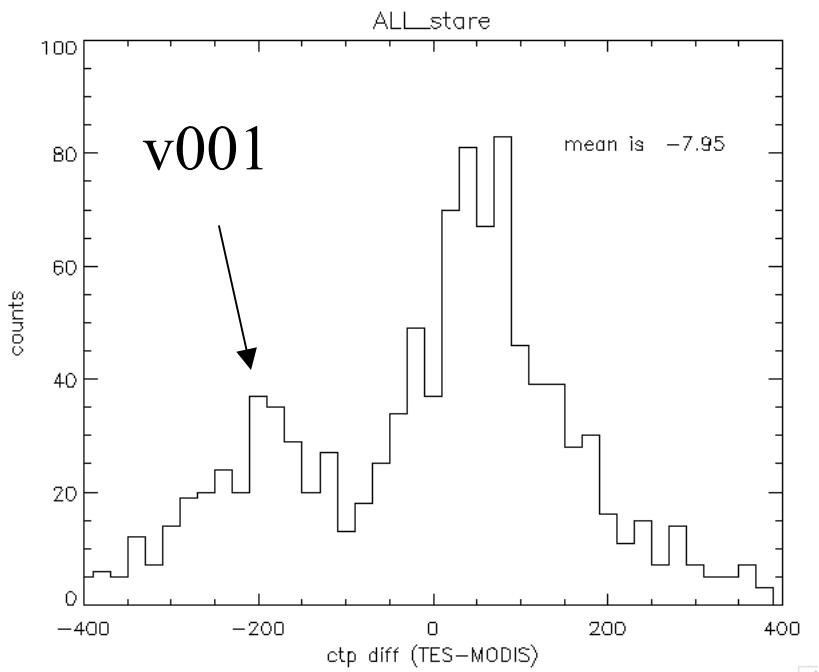
Boersma

School measurements provide potential for dense network that cannot be reached with professional instruments! (D. Brooks – Drexel University)

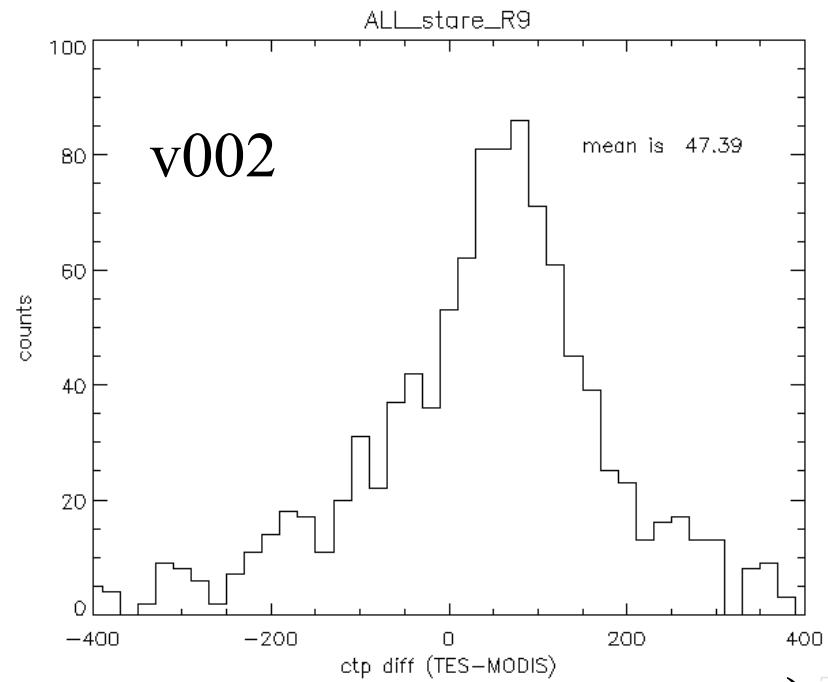


Improvements in data products

Improvement of TES v002



Cloud Top pressure differences (TES-MODIS)



Cloud Top pressure differences (TES-MODIS)

- No longer have tail of -200 mb differences

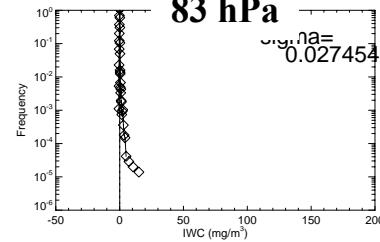
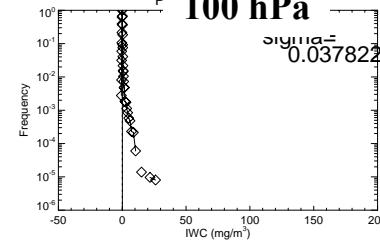
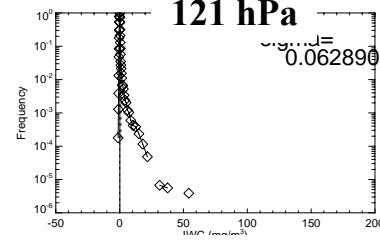
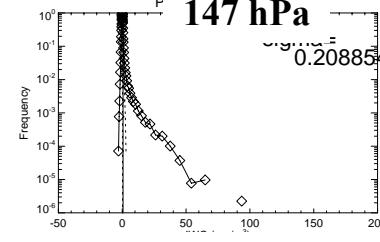
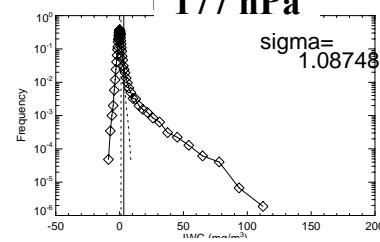
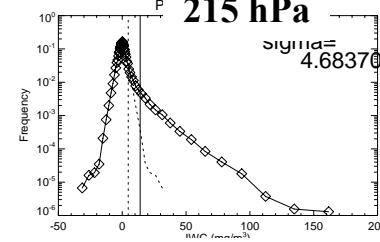
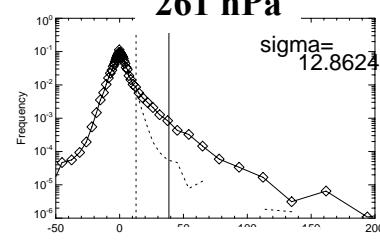
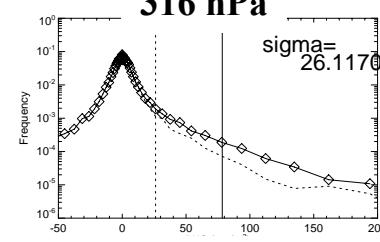
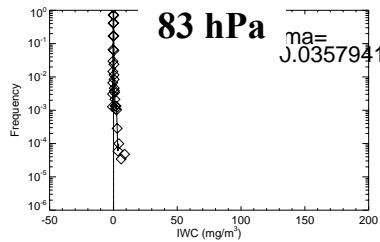
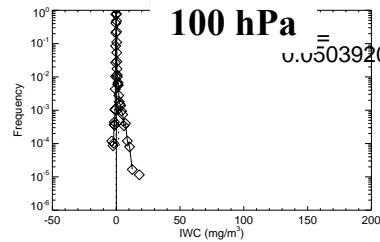
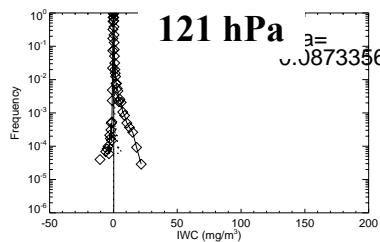
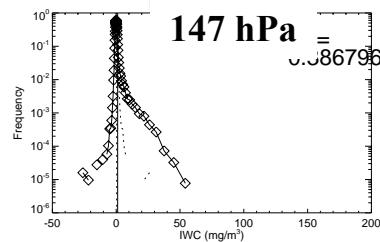
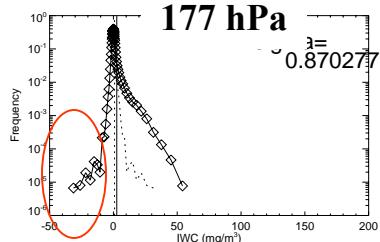
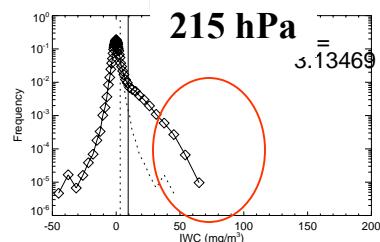
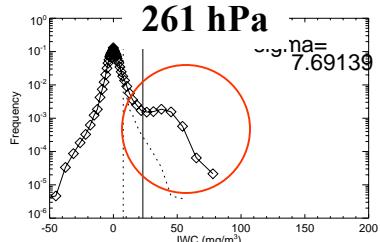
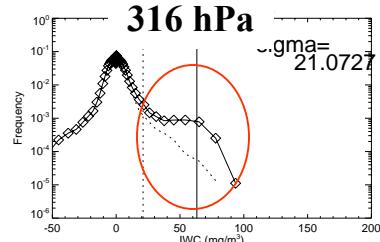
V2.1 vs. V1.5 IWC statistics: Probability Density Function (PDF)

V1.5

- lacks of IWC $> 50 \text{ mg/m}^3$
- some large negative outliers
- latitude-dependent biases
- false alarms at high latitudes

V2.1

- more IWC $> 50 \text{ mg/m}^3$
- no large negative outliers
- little latitude-dependent biases
- reduced false alarms at high latitudes



Validation Challenges

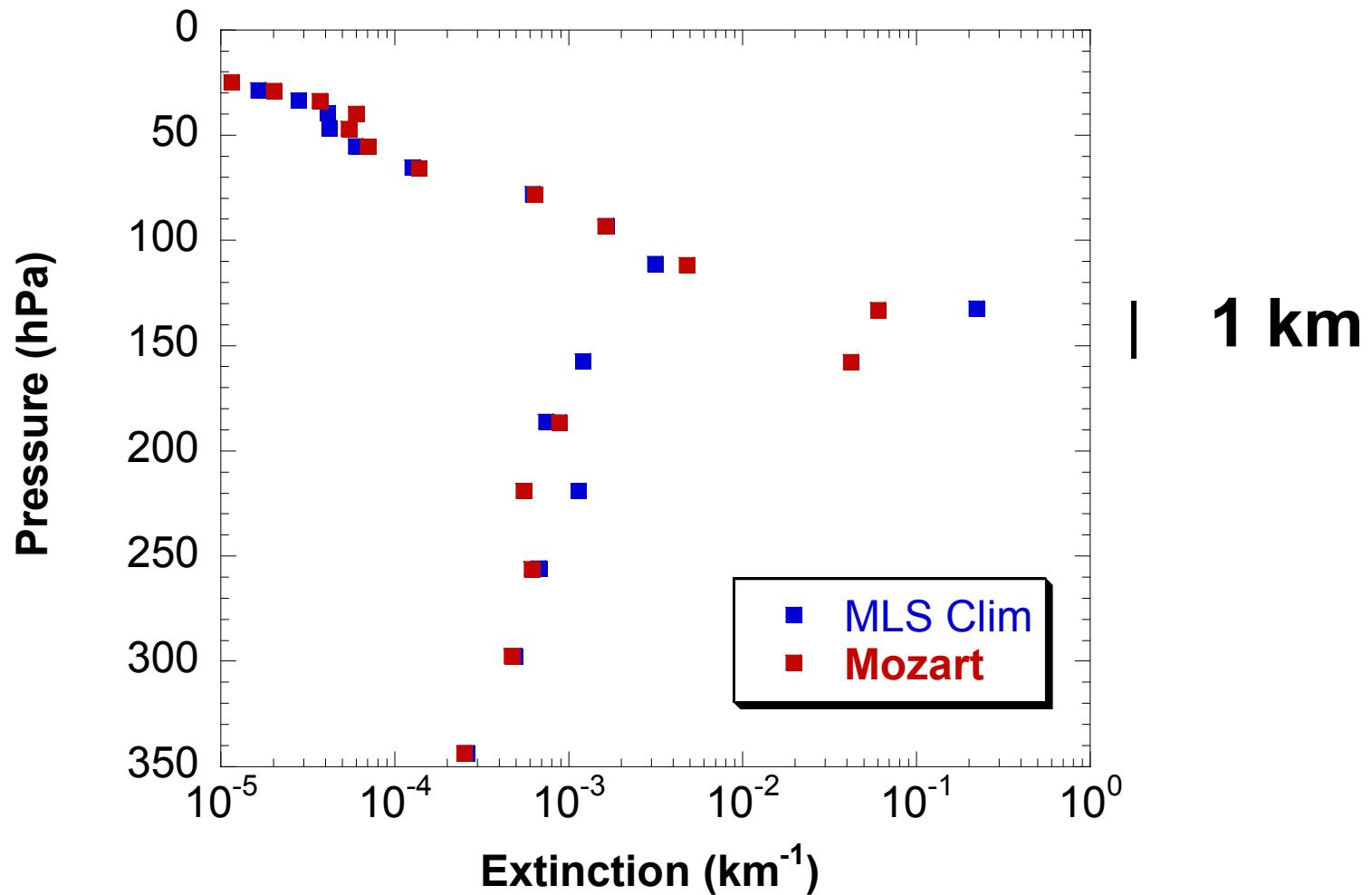
Very large Vertical Gradients in Extinction



CR-AVE February 2, 2006

HIRDLS Ch 6 (12 μm)

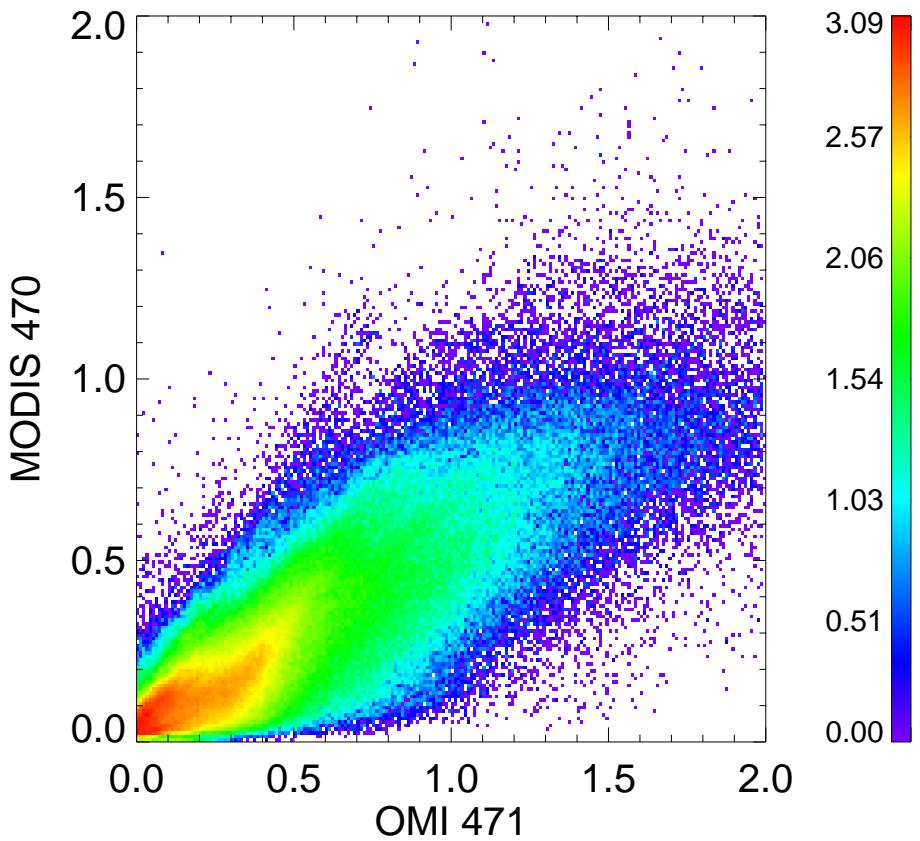
Lat 6, Lon -86, Prfid 5349



Massie et al

Results of Comparison

Braak et al

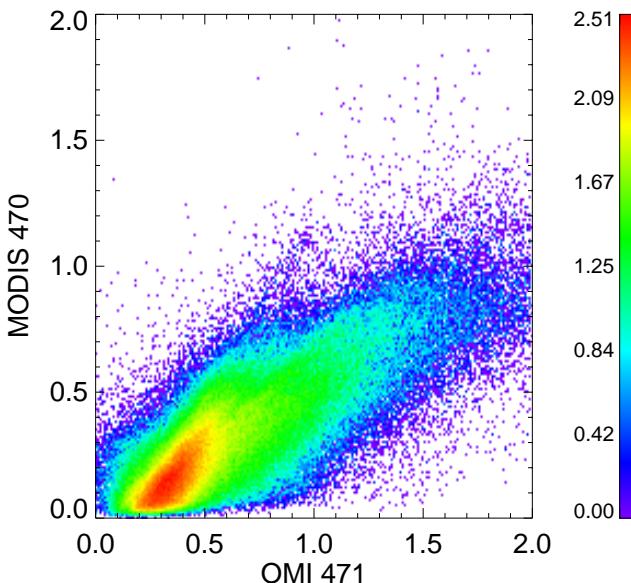


$r = 0.833, \alpha = 0.477, \beta = 0.053, N \sim 620,000$

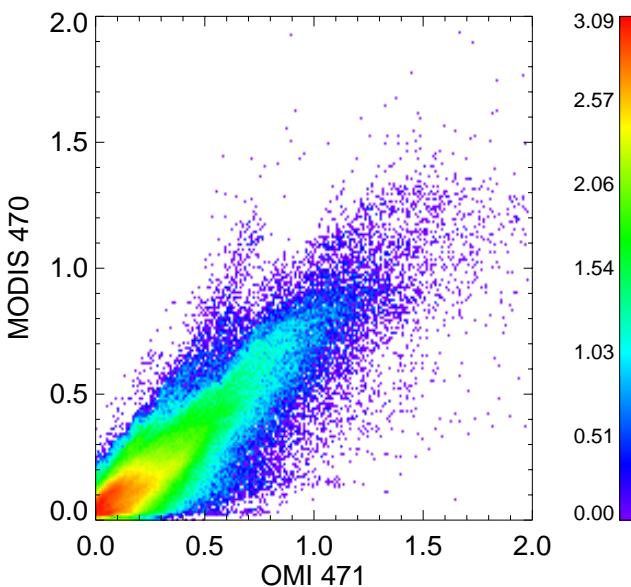
slope

r correlation, α slope, β intercept, N # obs

Land only
 $r = 0.814, \alpha = 0.466, \beta = 0.033, N \sim 260,000$



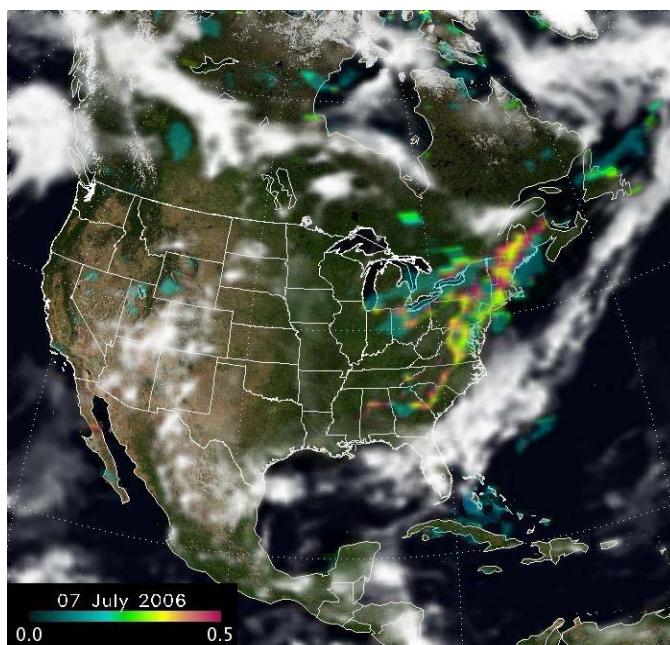
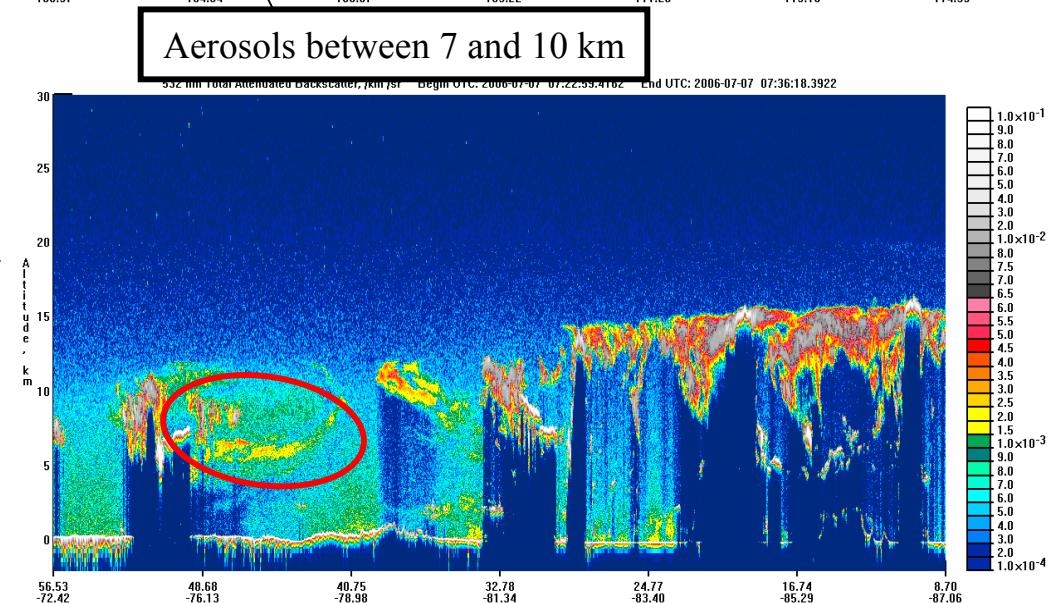
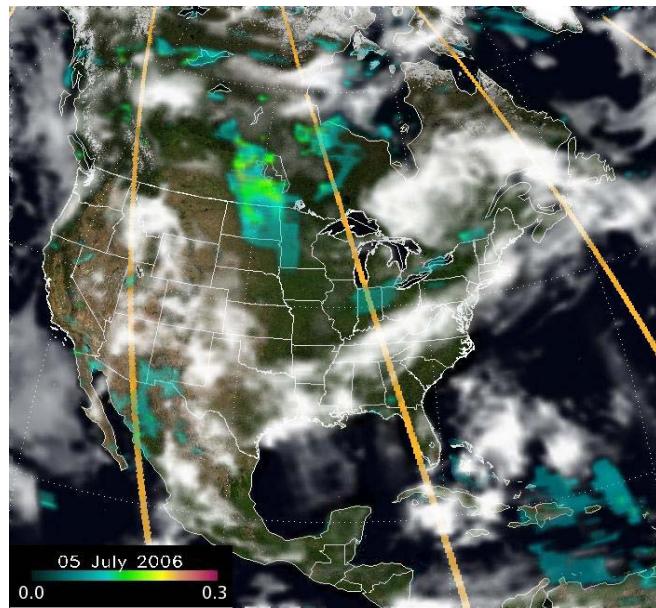
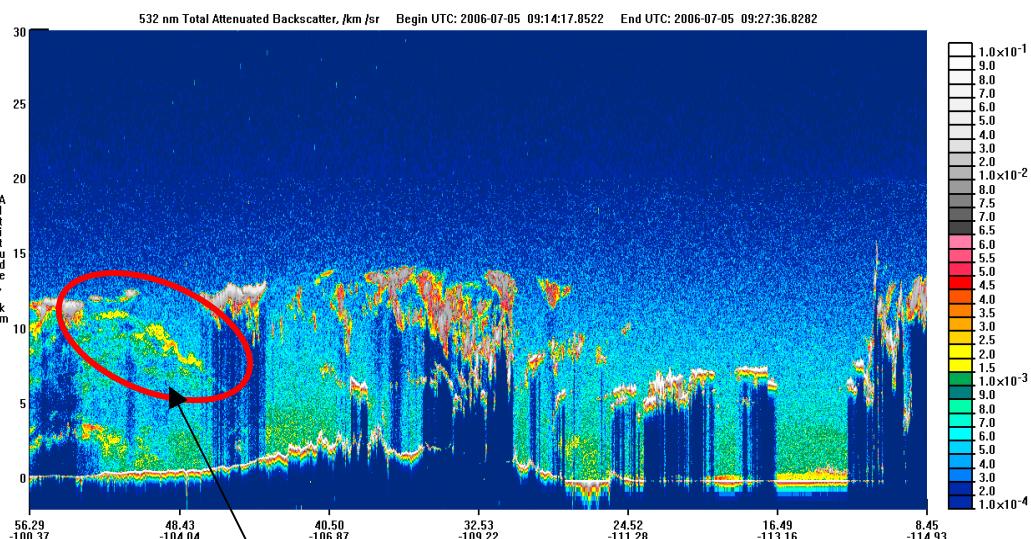
Ocean only
 $r = 0.862, \alpha = 0.650, \beta = 0.032, N \sim 350,000$



OMI and CALIPSO Observations on July 5 and 7

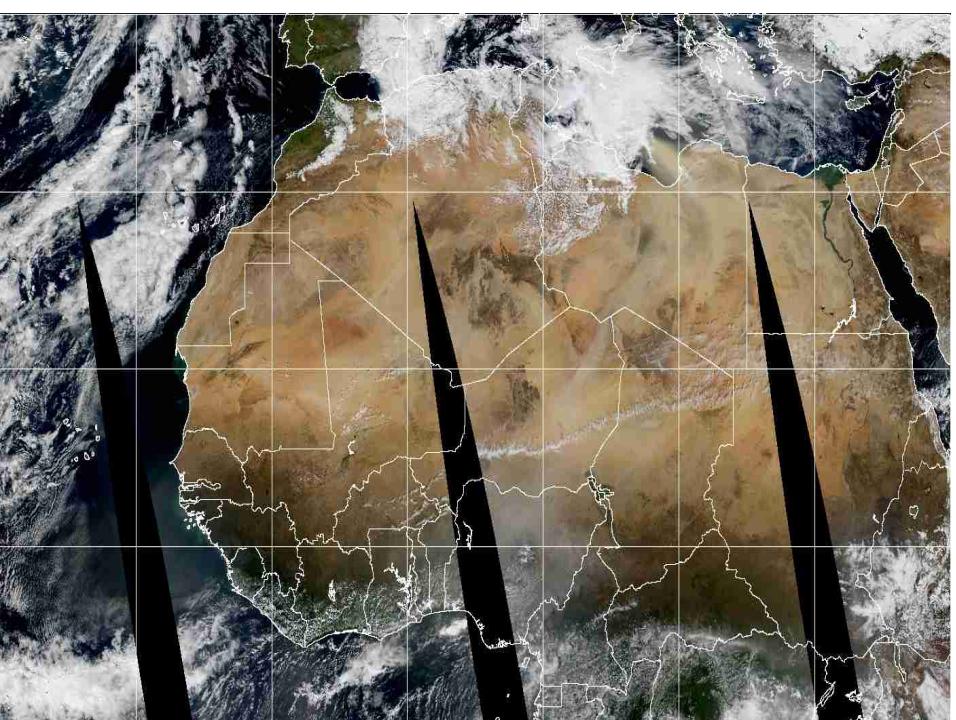
Torres et al

Credits: CALIPSO Science Team



New Algorithms / Directions

31 January 2006

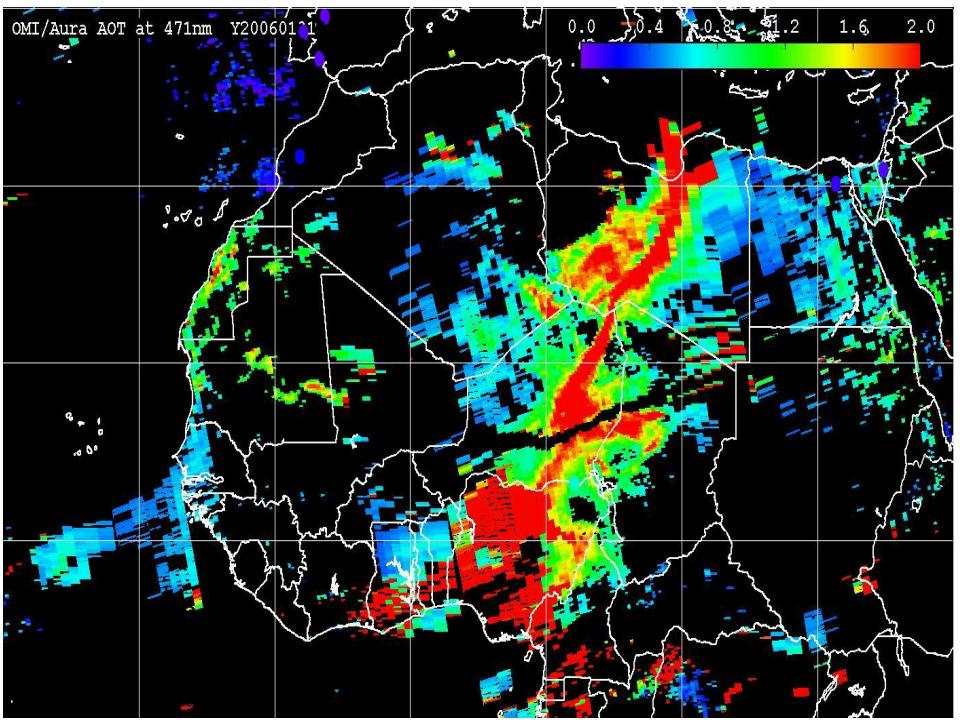
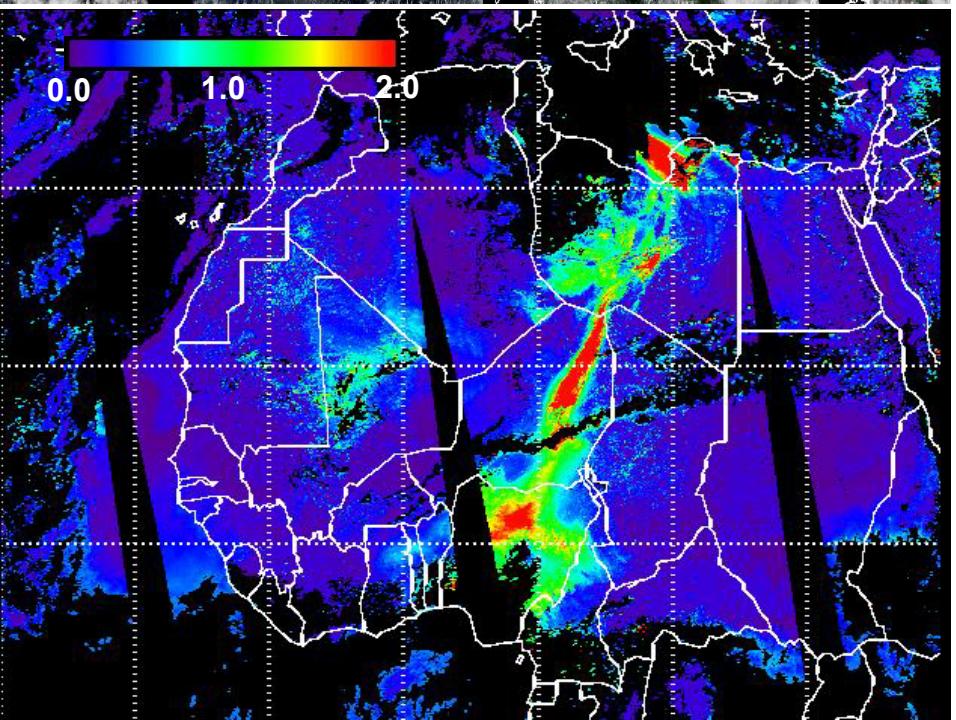


MODIS/ Aqua *RGB* Image

MODIS *Deep Blue: @470nm*
Aerosol Optical Thickness

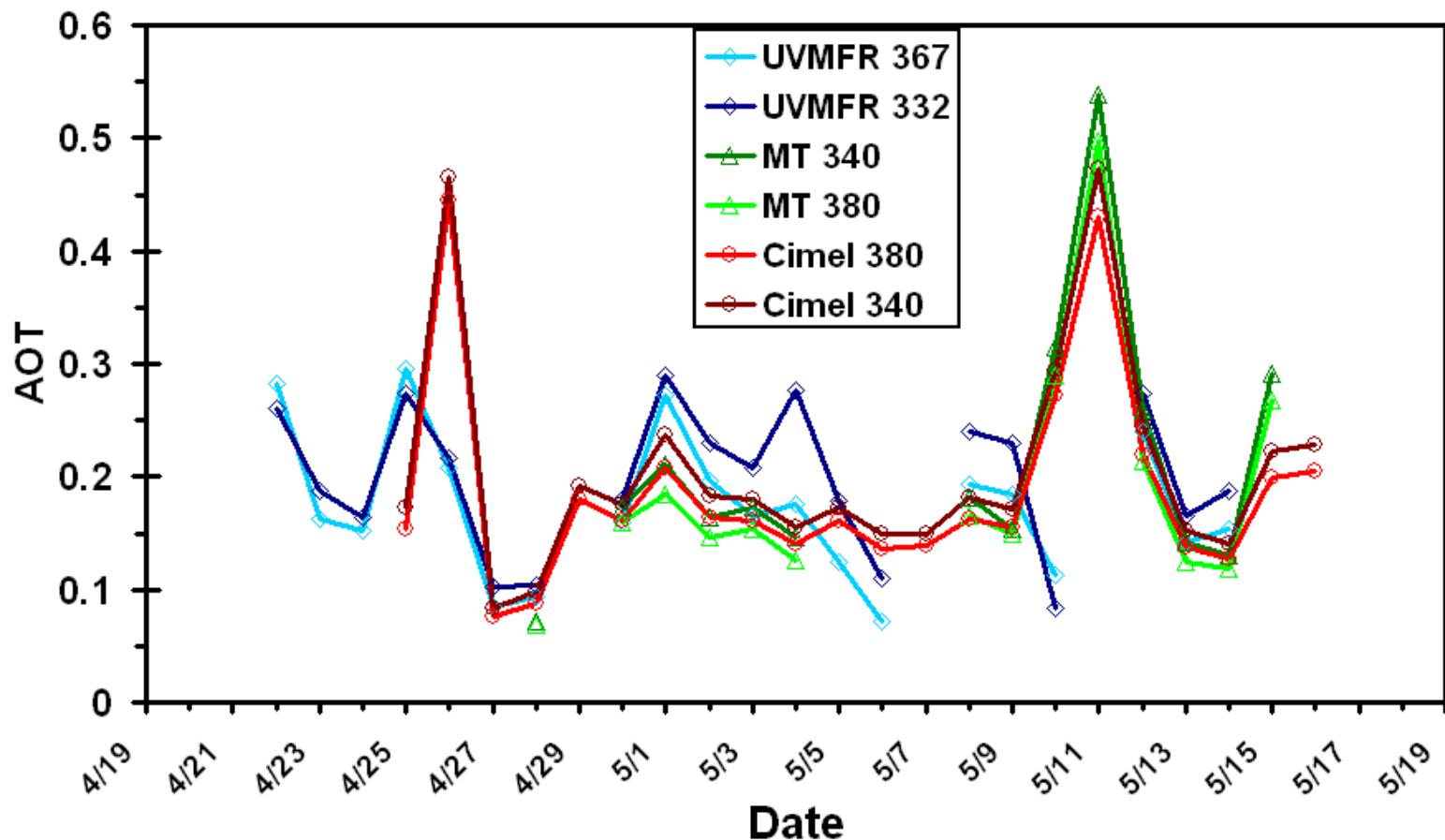
Hsu et al

OMI retrievals: @ 500 nm
Aerosol Optical Thickness





Richland NATIVE AOT



Multi-Wavelength Approach (20 λ 's)

- Best fitting aerosol model
- Information on Type, AOD, SSA, Size, Height?
- Surface reflectivity? Clouds?

